Journal of the Kansas Entomological Society

Volume 18 July, 1945 Number 3

PUBLICATION COMMITTEE

PAUL B. LAWSON, Editor, Lawrence
R. H. BEAMER, Lawrence R. H. PAINTER, Manhattan
DWIGHT ISELY, Fayetteville, Ark.

JAMES WALKER McCOLLOCH
1889-1929

Entered as second-class matter June 7, 1939 at the Post Office at Manhattan, Kansas, under the Act of August 24, 1912.

JOURNAL OF THE KANSAS ENTOMOLOGICAL SOCIETY

A quarterly journal published in January, April, July and October devoted to Entomology in the Western Mississippi Basin and the proceedings of the Kansas Entomological Society.

Manuscripts for publication may be sent to any of the publication committee.

The Kansas Entomological Society does not make exchanges since the Society does not maintain a library.

Subscription to the Journal must be paid in advance. The subscription rate is so low that second notices are not ordinarily sent out.

Payment of Canadian or other foreign subscriptions and bills must be made by international Postal Money Order or by a draft on a New York bank and payable in U.S.A. dollars.

Subscribers are urged to give us their full cooperation in these matters.

Subscriptions should be sent to Donald A. Wilbur, Department of Entomology, Kansas State College, Manhattan, Kansas.

Subscriptions in the U.S.A.,	**$1.50 per year**	**Single Copy**
Canadian or foreign subscriptions,	**1.75 per year**	**60 cents**

KANSAS ENTOMOLOGICAL SOCIETY

President, H. H. Walkden, Hutchinson, Kansas
Vice-president, Paul B. Lawson, Lawrence, Kansas
Secretary-Treasurer, Donald A. Wilbur, Manhattan, Kansas

Vol. 18, No. 3, July, 1945

This issue mailed July 28

de-
lings

com-

the

tion

t be
York

ters.
nto-

Copy
ts

Kansas Entomological Society
Volume 18 July, 1945 Number 3

THE FOURTEENTH OR 1944 ANNUAL INSECT POPULATION SUMMARY OF KANSAS[1]

GEO. A. DEAN,[2] ROGER C. SMITH[2] and E. G. KELLY[3]
Kansas Agricultural Experiment Station

This insect population summary for Kansas covers the calendar year 1944 and is the fourteenth in a continuous series which began with the year 1931.[4] The information recorded here is based on a summary of 287 questionnaires of the score card type from the sources indicated in Table I together with the observations and comments of the authors, their colleagues and of those returning the score sheets.

Table I. Source and Numbers of Questionnaires Summarized for this Report

	No. in July	No. in October
Group 1. Entomologists in the state	0	5
Group 2. County Agriculture Agents	65	62
Group 3. Farmers, mostly college graduates	35	8
Group 4. Vocational Agricultural Teachers	51	61
Total reports of each group	151	136
Grand total of all questionnaires summarized for this report	287	

Summary of Weather Conditions (Fig. I and Table II) in Kansas by Months During 1944.[5]

January was 4.5° above normal, making it the mildest January since 1938 and one of the mildest on the state's record. There was a record-breaking fall of moisture in the western part mostly in the form of snow. The mild weather over practically all of the state the latter part of the month was most favorable for the wheat crop.

---

[1]Contribution No. 542 from the Department of Entomology.

[2]Entomologists of the Agricultural Experiment Station.

[3]Extension Entomologist, Extension Division.

Recognition and appreciation for assistance given during the preparation of this summary are due to the same sources and largely to the same individuals who supplied information for recent, previous reports. They consist of the persons grouped in Table I.

[4]For the other summaries in this series, see the **Journal of the Kansas Entomological Society** for the summaries for 1931 (vol. 5); 1932 (vol. 6); 1933 (vol. 7); 1936 (vol. 10); 1937 (vol. 11); 1939 (vol. 13); 1942 (vol. 16); and for 1943 (vol. 17) and the **Transactions of the Kansas Academy of Science** for 1934 (vol. 38); 1935 (vol. 39); 1938 (vol. 42); 1940 (vol. 44) and for 1941 (vol. 45).

[5]Notes and Table II based on Climatological Data: Kansas Section, Weather Bureau, U. S. Dept. of Commerce by S. D. Flora. Vol. 58, 1944.

February weather was mild, with frequent and ample precipitation mostly in the form of snow which made the month favorable for the wheat crop over Kansas, though field work was hampered by wet soil much of the time. The average precipitation for the state was 1.22 inches which was more than any February in the previous 15 years.

March came very nearly being a record-breaker for wet and unseasonable cold and cloudy weather over the entire state, which caused the spring work to be from three to four weeks behind the season in many localities. It was favorable, however, for wheat. The average precipitation for the state as a whole was 2.96 inches, which was 1.52 inches above normal and exceeded only in 1892 and 1922. It was a month of steady cold with no extremes of high or low temperatures.

April was a record-breaker over Kansas for heavy and frequent rains and excessive cloudiness. It also nearly broke the record for abnormal coolness. There were devastating floods in the eastern and south-central portions and farm work was at a stand-still through almost the entire month. The average precipitation for the state as a whole was 7.25 inches, which was almost three times the normal amount and the greatest ever recorded for April and the greatest total for the first four months of the year. Rains occurred almost every day after the first week in all parts of the state. Freezing weather occurred in all parts and with frequency in the northwestern counties. Very little damage to crops occurred, however, due to the late season.

May had an abundance of moisture and was generally warm and sunshiny weather after the first week, which made it favorable for crop growth. The first week, however, was cold with a freeze on the 5th and 6th in all parts of the state, except the extreme southwestern counties. The rain was heavy over the southwest quarter and several southeastern and extreme northeastern counties, but was somewhat below normal over a large area. Most of the rain fell on the first 3 days and the last week.

Crops were behind the season, but grew well. Few spring crops were far enough along to be damaged by the general freeze on the 5th and 6th. Planting corn was delayed by the wet cold weather the first week and hampered by hard, crusted upper soil the third week of the month. Cutting the first crop of alfalfa and planting grain sorghums began the last week.

June was warmer than usual, but deficient in rainfall in many parts of the state. Heavy local rains occurred in a number of places with dry weather prevailing in adjacent localities. Hail storms were numerous and damaging. The month was favorable for maturing and harvesting wheat. Corn made an excellent growth. In the southeastern counties, some of the crop had been laid by and was beginning to tassel. The first cutting of alfalfa was made and by the closing week the second crop was almost ready to cut.

July was unusually cool and cloudy over Kansas with near record-breaking rainfall over the western two-thirds of the state. The average in the

western third was 5.54 inches; and for the state as a whole, 4.73 inches, which was the greatest amount for July since 1922. The mean temperature for the state, 77.4°, was 1.8° below normal, making it the coolest July since 1927. It was an exceptionally favorable month for corn, especially in the western two-thirds of the state. By the close of the month the crop was in the roasting ear stage in the eastern part of the state in silk and tassel elsewhere. Grain sorghums, soybeans, and broom corn made a fine growth. Pastures, alfalfa and sweet clover were excellent. Wheat harvest was completed rather early in the month, except in the western part of the state where it was materially delayed by heavy rains. Heavy weed growth, lodging, black stem rust and shattering of unharvested wheat materially reduced the yield of crop. Also there was considerable spoilage from wheat being piled on the ground on account of a shortage of storage and shipping facilities.

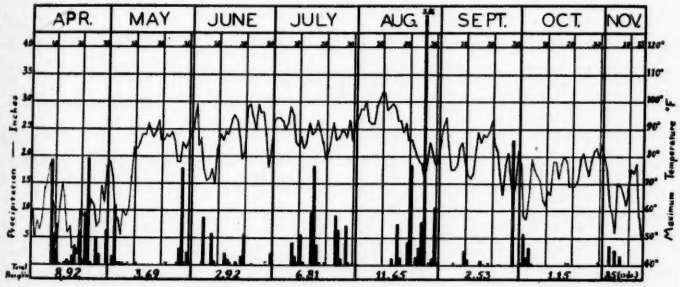


Fig. 1. Daily rainfall and temperature chart for the growing season of 1944, at Manhattan, Kansas. Chart prepared by D. A. Wilbur.

August was a month of frequent and heavy rains over the eastern two-thirds of Kansas, which gave that section, with one exception (August 1927) more rain than had ever fallen in August since the state-wide record was begun 57 years ago. The average for the state as a whole was 5.63 inches. The extreme western part of the state was decidedly deficient. The mean temperature for the state was 77.9°, which was normal. It was an exceptionally favorable month for crop growth and left the soil in good shape for fall seeding, except in some of the extreme western counties. Pasture, alfalfa, grain sorghums, and broomcorn grew well. Sowing wheat began in the western counties the closing week.

September was a month with heavy rains in the southeastern and south-central parts, but deficient in the northern and western counties and decidedly deficient in the extreme western portion. There were some warm periods during the month, but in general, it averaged below normal and

Table II. Summary of Weather Data for the State of Kansas for the period September 1, 1943 to December 31, 1944

Month	Temperature in degrees Fahrenheit					Precipitation in inches					
	State Mean	Maximum	Minimum	Mean for 58 years	Departure from normal	State Average	Average for 58 years	Departure from normal	Eastern third	Middle third	Western third
September, 1943	67.5°	102°	29°	69.7°	—2.2°	2.39	2.82	—0.43	4.19	2.42	0.57
October	55.8°	96°	11°	57.3°	—1.5°	1.67	1.98	—0.31	2.45	1.96	0.59
November	42.5°	82°	9°	43.2°	—0.7°	0.22	1.26	—1.04	0.30	0.20	0.15
December	30.8°	68°	—21°	33.2°	—2.4°	1.50	0.87	+0.63	2.11	1.59	0.81
January, 1944	34.4°	73°	—21°	29.9°	+4.5°	1.09	0.69	+0.40	0.67	0.89	1.70
February	36.3°	80°	—20°	33.2°	+3.1°	1.22	0.99	+0.23	1.59	1.27	0.80
March	39.2°	77°	2°	43.3°	—4.1°	2.96	1.44	+1.52	4.17	3.15	1.55
April	49.4°	85°	12°	54.8°	—5.4°	7.25	2.64	+4.61	8.89	6.85	6.02
May	66.4°	99°	25°	63.9°	+2.5°	3.90	3.81	+0.09	3.68	3.45	4.58
June	75.4°	112°	41°	73.9°	+1.5°	2.93	4.02	—1.09	4.56	2.69	1.55
July	77.4°	106°	46°	79.2°	—1.8°	4.73	3.13	+1.60	3.73	4.94	5.54
August	77.9°	110°	39°	77.9°	0 °	5.63	3.19	+2.44	8.30	6.75	1.85
September	69.2°	103°	29°	69.7°	—0.5°	1.92	2.81	—0.89	2.95	2.12	0.69
October	58.9°	91°	25°	57.3°	+1.6°	1.73	1.97	—0.24	2.29	1.65	1.25
November	45.7°	85°	5°	43.3°	+2.4°	1.96	1.27	+0.69	2.71	2.01	1.15
December	30.8°	64°	— 5°	33.1°	—2.3°	2.15	0.90	+1.25	3.58	2.02	0.86
Averages or total for 1944	55.1°	112°	—21°	55.0°	—0.1°	37.47	26.86	+10.61	47.13	37.79	27.54

there was more cloudiness than usual in September. Most of the rain occurred during the last four days. Light frost was reported on the 24th in a few northwestern localities. Sowing wheat was nearly completed by the close of the month. Early seeding came up to good stands, except in the extreme west, where there was a lack of soil moisture. Practically all corn and grain sorghum crops matured and much was cut for silage and fodder. Prairie hay and alfalfa hay harvest was completed. Proomcorn was cut in the southwestern counties and soybean harvest began in the eastern part of the state. Pastures dried up somewhat but had an excellent carrying capacity.

October was mild, sunshiny and pleasant weather prevailed over the state with little rainfall after the first week. The last half of the month was exceptional Indian-summer weather. No snowfall was reported. The rainfall, which was somewhat below normal except in the southeastern and some western counties, was well distributed over the state. The soil moisture was ample, except in a few western counties. Light freeze and killing frosts were reported on the 12th over most of the western half, north central portion, and in the extreme northeastern part. Elsewhere there were only light to heavy frosts. Wheat seeding was completed and good stands covered the ground. Fine weather the latter part of the month enabled the farmers to catch up with their work, fill the silos and get much of the corn picked, with per acre yields the highest in more than 60 years. Plenty of rough feed was in sight, and pastures were in good shape.

November was a month of exceptionally mild fall weather and an ample fall of moisture in nearly all parts of Kansas. It was favorable for the growth of wheat, husking corn and threshing grain sorghums. There was, however, an excessive amount of cloudiness. The rainfall was well distributed, but barely sufficient for the western counties where the crop had rank top growth and required much moisture. Wheat made an unusually fine fall growth and furnished good pasture for livestock. Grass pastures were excellent, corn husking three-fourths completed in many of the eastern counties, and harvesting and threshing the record breaking crop of grain sorghums was more than half completed, but lacked storage and shipping facilities.

December was excessively cloudy, and one of the wettest on record over the eastern half of the state and above normal over the western half. Heavy rains the first week caused the December overflows along the rivers in southeastern Kansas, which overflows were among the greatest ever known by these streams. This was followed by heavy snow fall over most of the state, making it too muddy, except when frozen, for farm work and for pasturing wheat. The mean temperature was 30.8° making it the coldest December in 12 years. Snowfall for the month totalled from four to eight inches. It was a favorable month for wheat, but very unfavorable for completing the corn and grain sorghum harvesting and doing farm work.

Crop Production Summary for 1944*

The year of 1944 was excellent for crops in Kansas. Wheat production Was estimated at 191,669,000 bushels, making it one of the largest crops in the state and nearly 1/5 of the all time record crop production in the United States. It was exceeded in Kansas only by the 1942 production of 200,101,000 bushels and the 1931 production of 251,885,000 bushels. Excellent yields were obtained in nearly all parts of the state except in the north central parts where the lack of moisture in the fall of 1943, damage by the hessian fly and black stem rust in May and June of 1944 caused a reduction in the yields, and in the western part where poor stands and late emergence occurred in the fall of 1943.

The 1944 corn crop of 114,793,000 bushels was the largest production since 1932. The sorghum grain production of 49,468,000 bushels was more than twice as large as the previous record crop of 21,885,000 bushels produced in 1941. Sorghum forage production totaled 3,088,000 tons or about 15 percent more than 1943. The production of soybeans in 1944 of 3,315,000 bushels greatly exceeded the record of 1942 which was 2,544,000 bushels.

The wet spring delayed planting of oats, barley and flax and resulted in the lowest yields for these crops in several years. Production of oats in 1944 of 28,098,000 bushels was about 59 percent of the 1943 crop and much below the 10-year (1933-42) average production of 35,931,000 bushels. Barley production of 14,348,000 bushels was somewhat less than the 1943 crop. The flaxseed crop for 1944 was 452,000 bushels which was 22 percent of the 1943 crop.

The all hay production in 1944 was estimated at 2,735,000 tons compared with the 2,440,000 tons produced in 1943. The cool, wet spring followed by frequent rains and moderate temperature throughout the summer and late fall, resulted in the largest all hay crop production since 1932.

The 1944 potato crop of 1,144,000 bushels was the smallest in a decade. Adverse weather and field conditions not only caused a large reduction in the acreage planted but also the yield. Colorado potato beetle, flea beetles, and serious potato leaf hopper infestations caused heavy losses.

The alfalfa seed crop for 1944 was estimated at 168,000 bushels compared with 238,000 bushels in 1943; sweet clover seed, 104,000 bushels compared with 96,000 bushels; popcorn was 7,980,000 pounds compared with 4,680,000 pounds in 1943.

Descriptive Account of the More Important Insect Activities and Climatic Relationships During 1944

The alfalfa plant bug, Adelphocoris lineolatus was common in Riley County. While this species is uncommon as yet, it appears to be increasing. No severe injury as yet has been noticed.

---

*From Kansas 1944 Crop Review, Kansas State Board of Agric. Statistics Division, Dec. 20, 1944. Mimeographed Release.

Ants. Winged forms of the genera **Cremastogaster** and **Monomorium** were numerous during the summer and early fall. Many inquiries were received as to whether they were termites. Ants found in houses and around steps and walks were reported from 82 counties.

The kafir ant was reported destroying sorghum seed in the St. Marys area.

Several species of **aphids,** such as the elm leaf aphid attacking elm, melon aphid infesting cucumbers, squash and pumpkins, and the corn leaf aphid attacking corn in northeast Kansas occurred in outbreak numbers.

Pea aphids which occurred in outbreak numbers in south central Kansas during March and April of 1943, appeared in a few counties of the same area during the spring of 1944, but there was practically no damage except in a few small spots. The heavy rains in April and May, together with the rapid growth of the alfalfa, no doubt was responsible for the failure of the aphids to injure the alfalfa plants. During the mild late fall there were in the alfalfa fields many adults, numbers of which were winged.

The green bug which threatened to cause severe injury to wheat and oats in 1943, and which caused some injury in small local areas in twelve of the southern and central counties, did not appear in noticeable numbers during the spring of 1944. It was reported June 16, however, by Dr. R. H. Painter in the heads of barley at Hays and Dr. E. G. Kelly reported it in the fall and early winter in a number of fields, causing in some instances brown spots in the wheat fields.

Cutworms during the early summer were reported widely over the state. Apparently the heavy rains prevented serious injuries or hastened recovery of the plants. They were scored at 2 in 33 counties; 3 in 23 counties and 4 in 3 counties.

Pale western cutworm, which became a serious pest in western Kansas, especially in the northwest, during the severe drought years, were not able to withstand the favorable growing years of 1943 and 1944. They were not reported as present.

Armyworms reported June 19, by Dr. Painter, were working on wheat heads at Fort Hays Agricultural Experiment Station. The wheat was lodged and the larvae cut off the heads.

Fall armyworms were observed to have been abundant in southeastern Kansas where they did considerable damage to Balbo rye, which was planted early for fall pasture.

Bagworms probably were somewhat more numerous and destructive in the eastern third of the state than in 1943 or in any previous year. They were scored at 3, 4 and 5 in many counties. They also were reported farther west than ever before, such as in Decatur County in the northwest and Mead County in the southwest.

Bean leaf beetles were numerous and destructive to bean foliage in Riley County and several counties in southeastern Kansas.

Bees did well in 1944. The Division of Statistics of Kansas estimated, Oct. 1944, honey production from 44,000 colonies of bees at 1,760,000 pounds of

honey compared with 1,672,000 pounds in 1943. The average production per colony was 40 pounds compared with 35 pounds in 1943 and 51 in 1941. The cold, late spring and heavy rains in April and May hindered early activity and deficient rain fall in June reduced the honey flow of sweet clover. There was a small smartweed nectar flow in some areas in August and September. The demand for honey was exceptionally good. There was little swarming during 1944.

Black crickets were reported as a nuisance and pest by 69 counties. They occurred in houses, stores, and fields.

Fleas attacking pets and man were reported from 93 counties. They were scored 2, 3 and 4 by 86 counties and 1 by 7 counties.

Flies of several species developed to abnormally large numbers in 1944 as a response to favorable weather conditions during the spring and summer.

Horse flies (Tabanids) were numerous in areas near woodlands, lowlands, and streams. They were more annoying along streams in western Kansas than usual. The heavy rains and flooded areas in many parts of the state made conditions favorable for the increase of these pests.

Stable flies and horn flies were very abundant—the population peaks following the many rains during the wet summer season. They were reported from 96 counties. 45 counties reported 4; 3 reported 5; 47 reported 3. The score numbers indicate this was one of the worst seasons on record.

Buffalo gnats or black flies were reported killing setting hens and chickens at Oberlin, Kansas, by C. I. Kern, County Agent, who sent in specimens of the gnats.

Screwworm flies occured in a medium outbreak in 1944. These worms were brought to Kansas by the large shipments of cattle from the southern states and northern Mexico. The flies and larvae became distributed through the counties in a few months. They increased rapidly and heavy infestations occurred during August and September. The records show that 5,872 farmers treated 34,736 head of cattle in 36 counties. Screwworms were reported from 80 counties. Screwworm infestations of sheep were common in many counties, with serious outbreaks in the vicinities of Woodson, Wyandotte, Leavenworth, Lyon, Franklin, Ford and Republic Counties. More than 600 growers treated with smear 62 and benzol for screwworms or wool maggots.

The sheep bot fly or "grubs in the head" of sheep were abundant in a few scattered areas, and caused some damage and deaths. Since there has been a large increase of sheep in Kansas, the bot fly has apparently increased correspondingly.

Cattle grubs and cattle lice occurred perhaps in normal numbers in 1944. The eradication of cattle grubs and lice, which is a major project of the extension work, has given excellent results. These campaigns are major contributions to the war effiort. There are approximately 4,000,000 head of dairy and beef cattle in Kansas. There were nearly 8,000 farmers, including

dairymen, who treated about 354,000 head of cattle or a little more than 8 percent for cattle grubs and lice in the 1943-1944 campaign. However, all of the 103 counties were organized for cattle grub and cattle lice control during the spring of 1945.

Horse bot flies were widely distributed in the state and probably were about as abundant as during the season of 1943. Nearly 3000 farmers had veterinarians cooperating with county agents treat 11,099 horses in 59 counties.

The sheep tick fly is one of the big problems for the wool and sheep producer. There were 2,505 growers who dipped 161,208 sheep for ticks. This resulted not only in an increase of lamb weight and wool clip, but also in a satisfied group of sheep producers.

Mosquitoes, due to an abundance of moisture and repeated overflows of streams throughout the state, were a nuisance and a serious annoyance. They were reported from every county except nine in the west fourth of the state. 52 counties scored 3, 27 scored 2, and 4 scored 4.

Box elder bugs were no more plentiful than in 1943. They caused little annoyance in and around homes. An interesting observation was made, by the senior author, of box elder bug nymphs severely injuring strawberries May 22 on a Manhattan property. They were feeding on the ripening and green berries and even the stems. The plants attacked were Senator Dunlap and Blakemore. There were several box-elder trees growing on an adjoining lot in close proximity to the strawberry plants. Many nymphs were in among the plants.

Cankerworms. There was some increase of the fall cankerworm at Manhattan. They reached the peak about February 18 or four days earlier than last year. The infestation of the spring canker worm probably was about the same as in 1943.

Calligrapha scalaris Lec. caused serious damage or defoliation of American elms at Manhattan, Salina, Wakefield, Miltonvale, Clay Center and Concordia. The species was far more abundant than any previous year. The partial defoliation of a few elms at Manhattan and Miltonvale in 1943 was the first report recorded in the state.

Datanas on apple, walnut, oak and sumac did some injury during the summer of 1944.

Hackberry nipple gall has become a serious pest of the hackberry throughout the greater part of eastern Kansas. The leaves begin to turn a light yellow by early summer, become unsightly, commence dropping, and littering the lawn until late fall.

Hackberry petiole gall (Pachypsylla venusta) was taken on hackberry at Manhattan this year for the first time. The petiole gall caused a disfiguration of the leaves.

The hackberry bud gall (P. gemma) also was taken at Manhattan this year for the first time. It destroyed the leaf buds in some instances.

Green striped maple worm defoliated large numbers of soft maples in Douglas, Jefierson, Atchinson and Doniphan Counties. The infestation should be scored at 4 or 5 in these five counties.

Redbud leaf roller has increased slightly in several parts of eastern Kansas where the infestation was scarcely noticeable during the previous two or three years.

Wood borers in trees of various kinds were reported, but the scores indicated they were less destructive than in the previous two years, and far below the peak of the drought years.

Buffalo treehopper (Ceresa bubalus Fab.) caused serious damage during May and June to tomato plants in Riley and Pottawatomie Counties. The young nymphs in feeding on the main stalks partially or completely girdled the stalks, thus killing the plants. The puncturing or girdling took place from the base of the plant to three or four inches above the base.

Cabbage worms were widely reported in the state in 1944, but the damage and numbers were no more than in the years of 1942 and 1943. Reports were recorded from 91 counties, 3 and 4 were scored by more than half of the counties.

Carrot weevils were observed in many gardens in eastern Kansas and caused damage in some gardens. The infestations were no worse than in some previous years, but the insect appears to be spreading westward since it is reported nearly 100 miles from the east border.

Tomato and tobacco hornworms were reported from all parts of the state. Due to the great interest in gardening stimulated by victory garden and 4-H club workers, tomatoes were grown in thousands of gardens. Reports were received from 62 counties of hornworms attacking tomato plants. Apparently they were somewhat more abundant than normal.

Colorado potato beetles were fairly plentiful and reported from 84 counties. While nearly all of the counties were scored 1 and 2, 14 were scored 3, which were widely distributed over the state. They were less numerous and destructive than in the two previous years.

Clover leaf weevils were common in Barber County and doing some visible damage to alfalfa. In one field from 12 to 25 larvae or more per square foot were observed. Crows and gulls were observed on Oct. 20, by Dr. Painter and Professor Wilbur, feeding on them in alfalfa fields.

Cotton-square borer (Strymon melinus) or **bean Lycaenid** or **gray hair streak** was reported and observed attacking pods of growing beans, July 14, at Manhattan. This same insect was reported by Dr. R. L. Parker as feeding on lettuce in 1943.

The pickleworm (Diaphania nitidalis) (Stoll) was reported attacking green cucumbers in several gardens in the Manhattan area. In some instances they caused serious damage.

The corn earworm during 1944 was somewhat above normal in numbers

and damage to sweet corn, field corn, sorghum heads, and tomatoes. It was scored 3 in 30 counties and 4 in 9 counties.

Codling moths as reported by Dr. R. L. Parker, were numerous and destructive to just about the same degree as in 1943. The frequent heavy rains interferred not only in making the applications of spray materials at the proper time, but they also caused a reduction of the spray residue. More sound apples, however, were produced and marketed in 1944 than in 1943 due to larger production on the trees and more growers doing spraying.

Chinch bugs, despite the rainfall which was far above normal during the growing season of 1944, increased and did considerable damage to corn and grain sorghums over the eastern half of Kansas. The early fall chinch bug survey indicated the presence of bugs over the eastern half of the state far in excess of expectations. A careful survey was then planned in cooperation with the Grasshopper Control Division of the Bureau of Entomology and Plant Quarantine, which survey was made during the last half of November. The Federal agents collected the bunch grass samples while representatives of the Division of Extension and Department of Entomology counted the bugs. As a result of the count, plans were made for an extensive control program in 1945, provided the winter survival of the bugs warranted such a program.

False wire worms again were below normal in western Kansas. They were reported from only 16 counties nearly all of which were in the southwest corner of the state. Five of the counties were scored 3. These pests were of sufficient importance, however, to cause 1229 farmers to use control methods on about 50,000 acres.

Garden webworms occurred in 1944 in mild outbreaks over a large portion of the state and in some parts did considerable damage. Three-fourths of the counties reporting webworm were located in the eastern half. Two counties in southeastern Kansas were scored 4. 24 counties distributed over the state were scored 2. 12 were scored 3 and 10 at 1. The webworm attacked soybeans in southeastern Kansas. Alfalfa was attacked in many fields. The worms were plentiful about mid-July. The crop was cut at the earliest possible date to prevent serious damage, and to prevent damage to the second and third crops. The seed crop also was protected by early cutting.

Grasshoppers. Despite the heavy rains and moisture in the growing season of 1944, grasshoppers increased and caused serious damage to alfalfa and wheat. The deficient rainfall in June probably favored the increase of the hoppers. Fall sown alfalfa and wheat were seriously damaged in more than 80 counties. In western Kansas, grasshoppers became sufficiently important to cause 6077 farmers to use poison bait for control. The bait prevented much damage, and farmers who did not apply bait lost a strip of wheat from two to four rods wide around the border of the fields. The adult and egg surveys indicated that there will be a need for grasshopper control in

1945. The survey and reports in the questionnaires scored 5 in 2 counties, 4 in 9 counties, 3 in 50 counties, 2 in 38 counties, and 1 in 4 counties.

Hessian fly caused less damage in 1944 than during the three previous years. The loss to the 1943 crop was estimated at 25,000,000 bushels, while the loss to the 1944 crop was estimated at 6,000,000 bushels. The hessian fly, however, continued to be the major pest to wheat growers. Dr. Painter has made the following report for the 1944 season.

"The fly infestation in the spring of 1944 occurred late and was distributed over a longer period of time, which resulted in an infestation relatively high up on the culms. In most fields only a relatively small amount of lodging from fly occurred in comparison with the number of culms infested. Parasitism was the highest observed in recent years and apparently was successful in reducing the fly population, especially in north-central Kansas. The earliest fall emergence occurred in the first week in September in north-central Kansas with a second late fall emergence in mid-October. Eggs were also laid in abundance in some wheat fields near Goddard, Sedgwick County. In some fields larvae were still present and apparently alive in January, 1945. The infestation in central Kansas appears to be very spotted and most abundant in Sedgwick, Reno, Sumner, and Kingman Counties."

Fall sown wheat was protected in 1944 by 29,600 farmers observing the recommended hessian fly control measures on about 1,636,100 acres.

Southwestern corn borer. Professor D. A. Wilbur in charge of the southwestern corn borer investigations made the following report of this insect for 1944.

"The total number of counties in which the southwestern corn borer has been taken, including Riley and Greeley Counties where it was first found in 1944, is 63. In all probability, however, infestations are present in from six to ten additional counties. There was an increase in population intensity in 1944 in those counties near the eastern and northern margin of the infested areas. This increase was particularly noticeable in Cowley, eastern Sedgwick, northern Russell, Ellsworth and the southern parts of both Rooks and Osborne Counties. These areas were infested previous to 1944, but without severe commercial damage.

"In a six county area including Kiowa, Edwards, Pawnee, Barton, Stafford and Rice Counties which had severe southwestern corn borer damage since 1941, the corn acreage dropped from 116,200 in 1943 to 44,430 acres in 1944 even though a favorable corn growing season was in prospect.

European corn borer was taken in 1944 for the first time in Kansas. One larva and one pupa were taken in a small sweet corn patch in a victory garden near the Fairfax air base of Kansas City, Kansas. A thorough inspection was made of all sweet corn and field corn growing in Kansas City within two miles of the infested sweet corn patch, but no additional infestation was found. Later a second inspection was made over the same area and although there were many small and large sweet corn areas in ideal

condition for the second generation of the corn borer larvae, no infestation was found. A third inspection was made during the late summer and early fall, but no larvae of the borer were found.

White grubs were reported from 77 counties doing damage to gardens, farm crops and lawns. Four of the counties were scored 4, 11 counties were scored 1, and 72 counties were scored 2 and 3. The **wheat white grub** which causes severe damage some years in the southcentral counties, caused only light damage in the spring of 1944. The good rains and other favorable growing conditions for wheat were contributing factors in favor of the wheat.

Several species of white grubs injured lawn grasses, strawberries, and garden plants.

The **white grub, (Cyclocephala immaculata)** is a white grub closely resembling **Ligyrus** gibbosus, the adult of which is the carrot beetle. The larvae of the carrot bettles transform to the adult in early fall and pass the winter as such. The larvae of **Cyclocephala immaculata,** however, continues to feed until cold weather, passes the winter in soil, passes into the pupal stage and changes to the adult in the spring. The identification of this grub clears up the mystery of several years — that of white white grubs doing serious injury to wheat in summer fallowed fields. **C. immaculata** is a species that requires only one year from egg to adult. The appearance of this species into the wheat fields may necessitate some changes in tillage to keep it under control. The injury to wheat in 1944 first appeared about the middle of September and continued well into November since the temperatures were above normal during the fall. The damage occurred in areas varying from a quarter of an acre to several acres and even in some instances to the greater part of the field. The damage was reported by farmers, county agents, staff members of Agricultural Experiment Station and Extension Division over the western half of the state. It was more serious, however, in the northcentral and western counties. One of the serious difficulties encountered by the growers are the weedy spots or areas at harvest time. Rank growth of weeds seriously interfere in combining wheat. To overcome or at least to lessen this difficulty, late replanting of the bare areas was recommended. Fotrunately the weather conditions in October and November were favorable for replanting and germination. This was done by many of the farmers, and in most instances not only good stands were had, but also little injury from the grubs occurred.

SUMMARY AND CONCLUSIONS

Temperature and moisture

The year of 1944 was the second wettest year on record in Kansas, the wettest being 1915. The average precipitation over the eastern third was 47.13 inches; the middle third, 37.79 inches; and the western third, 27.54 inches. The average was almost 50 percent more than 1943. Bumper crops

resulted from the favorable weather conditions that prevailed almost without a break. The summer months were comparatively cool and pleasant. A comparatively mild, dry autumn prevailed, with the first killing frost deferred until an unusually late date. This permitted the crops to mature and favored fall growth and seeding the new wheat crop. December was exceptionally wet and furnished an abundance of moisture to carry wheat through the winter. The heavy rains caused serious overflows of streams in the eastern third of the state.

Insect Occurrence

Outbreak numbers: Bagworms, green-striped maple worms; grasshoppers in western Kansas and chinch bugs in eastern Kansas, despite the excess rainfall, southwestern corn borer, white grub, **Cyclocephala immaculata** in western Kansas, garden webworm, mosquitoes, **Calligrapha scalaris** in local areas, stable flies, horn flies and horse flies (Tabanids).

More numerous than in 1943: In addition to the insects listed above, the following ones were more numerous than in 1943: bean leaf beetles, termites, cabbage worms, tomato and tobacco hornworms, corn earworms, grasshoppers in eastern Kansas, white grubs, fleas, black crickets, house flies, corn leaf aphids, melon aphids, leaf hoppers, and the redbud leaf roller.

As plentiful as in 1943: House and lawn ants, hackberry nipple galls, elm aphids, screwworm flies, sheep bot flies, cattle grubs, cattle lice, horse bot flies, sheep tick fly, box elder bugs, canker worms, datanas, carrot weevil, Colorado potato beetle, clover leaf weevils, and the codling moth.

Less plentiful than in 1943: Green bug, armyworms, fall armyworms, false wire worms, hessian fly, pea aphids, kafir ant, blister beetles, wood borers.

Scarce: Pale western cutworms; European corn borer which appeared in Kansas for the first time (two specimens taken); hackberry petiole gall was taken on hackberry at Manhattan for the first time.

Table III. Population summary of the more common and important insects in Kansas for 1944, as indicated by questionnaire score sheets from nearly all counties

Key—

1. Scarce.
2. Plentiful, but damage was neither noticed nor reported.
3. The species was abundant. Some damage was either seen or reported.
4. Local outbreaks. The species was doing severe damage in certain fields.
5. The species was in general outbreak. The insects were doing their greatest damage or were as plentiful as they ever get in a locality.

Note: This table represents the population scorings by counties for each species of insect listed in the questionnaires, in so far as reported. To use this plate, copy the scores for each species in the counties of a state map.

	ANTS	BAGWORMS	BLISTER BEETLES	BORERS-TREE	CABBAGE WORMS	CATTLE GRUBS	CHINCH BUGS	CODLING MOTHS	CORN EARWORMS	CRICKETS	CUTWORMS	FALSE WIREWORMS	FLEA BEETLES	FLEAS-PETS	FLIES-BITING	FLIES-SCREWWORM	GARDEN WEBWORMS	GRASSHOPPERS	HESSIAN FLIES	HOUSE FLIES	LEAFHOPPERS	MITES-CHIGGERS	MITES-MANGE	MOSQUITOES	POTATO BEETLES	ROSE SLUGS	TENT CATPILRS	TERMITES	TOMATO WORMS	WALNUT WORMS	WHEAT STRAW WMS	WHITE GRUBS	WIRE WORMS			
ALLEN	3	3	2		2	3	4	2		3	3			3	4	4	4	3				4		4									2			
ANDERSON		3			2			1				3		3	3	2	1	2																		
ATCHISON	2	3			3	2	3	5	3	1		2		4	4			2					3	2									2			
BARBER	2		1		2	2	3	1	3					3	4	3	3	2					4													
BARTON					2	3				3	4	3		2	4	4	2	2					4													
BOURBON	3	3	3	2	2	3	1	4	3	3	2			3	3	2	3	3	3				3													
BROWN		2	2		1	3		4	3	2	3			3	4		1	2	2				2													
BUTLER	1	3	2		2	2	2	4						2	4	3		3	3				3	3				1				2				
CHASE	1	2	1	2	3	3	4	4	2	4	1	1		3	4	3	2	2										2								
CHAUTAUQUA	3	3	3	2	2	3		4	3		1	2		3	4	4	2	3	1				3	2				2	1			2				
CHEROKEE		3	3		2	1		4		2				3	2	4		3	3									1	1							
CLARK	3		2		1	1				3	2			3	4			2					3													
CLOUD		1	3		1	3		4			2	2		3	3	2		2	3	3		2	2					2								
COFFEY	3	4	2	1	2	3		4	2	3	1	2		3	4	4	2	3	1		3	1	3			3									
COMMANCHE	3		2	3	3	2				3				3	3	1		2					2					2								
COWLEY	2	2	2		2	3		4	1	1	1			3	3	2	2	3	1		3		2	2				2								
CRAWFORD	3	3	2		2	4		5	2	2	1			3	3	1	2	3	3				2	1					2							
DECATUR	1	1	1	2	1	2	4				3	2		2	5		2	3		3		3	2			3		1								
DICKINSON	3		3		2	3		4		3	2			3	3	3	3	3	3				3					1	2							
DONIPHAN	3	2	2	1	4	3		4	4		2	3	3	4	4	3	1	1	3	4		4	1	2				2	1			2				
DOUGLAS		5						1			2			3	4	3		3								1		2	1							
EDWARDS	1		3	2	2	3			2	3	3			2	3	3	2	2				3	3					2			3				
ELK	1		3	3	3	3		3	3	3	2	2		3	4	3		3	3			1	3			2		2			2				
ELLIS	1		1	1	2	2				3	3	2		2	3	2	2	2	1		1		1	3		2					3				
FINNEY	2	1		3	2	2	3		2	3	3	3	1	1	4	1	2	3			3	1	3								2				
FORD	1	2	2	2	1	2				2	3	2		3	4	3		2				1													
FRANKLIN	1	2	2	2		2		2	2	2	2	1		3	3	2	1	3	3		3		2					2							
GEARY			1		2		3				2			3	3			2	3		2		2												
GOVE					3	2			3	3	2			1	4	3		2	1			2	3					2			2				
GRAHAM	3				2	4					3			2	5			3	2		3		3								3				
GRANT	2		1									1			5																2				
GRAY	1									2	2			1	2			2				1	2				1								
HAMILTON	3		2		2	3			1	3	1			2	2	2	4					1	3				1				3				
HARPER	3		1		2	2		2		2	3	2		3	4	2	2	3	1		4						1				2				
HARVEY	3	1	3	3	2	3		4	3	4	3	1		3	3	2	3	2	4			2	4				3	2			3				
HASKEL	3		1		3				2		2	1			2	1		3				2					3				2				
HODGEMAN	1		2	1	4					3	1			3		1						3	3				3								
JEFFERSON	1	3	2		1		4	2		1			4	3	2	2	2						2												
JEWELL	2	1	2	3	3	1		5		4				3	3	1	3	2	2		1		1	5				2	2			3	4			
JOHNSON	1	5	1	1	2	3		2	3	3	2	2		3	4	2	1	2	3				1	5								2			
KEARNY				1	1	4					2				1			4					1	3											
KINGMAN	2	1	3	3	3	4		4				4		3	4	3	2	1	5		3		3	2				3				3			
KIOWA	1	1	1		3	2			1	3	2	1	3	2	3	1		3					2			1						3			
LABETTE	4	3	4	3	3	4		3	4	4	3	3		3	4	1	4	3	3		3		3	4				4	3			3	2		
LANE			1	3	3					2		1			3	2		3			1											3			
LINCOLN	1		1	1	2	4		3	2		4			2	3			3	2				3	2								1			
LINN	3	3	2	3	2	3			4	4		2		3	3	3		2	3		3		2	3				3				2			
LOGAN	1		2	2	3	1		1	1	1	3		3	1	3	4		3			2		2									3			
LYON	1	4	3	2	3	3		4	3	3	2	2		4	4	4	3	4	3		3		3	3				2	3			4			
McPHERSON	2				2	3		4			3	3	3	3	4	3		2	4				3	3								4			
MARION	3		3		2	3		4			2	3		4	4	2	3						2												
MARSHALL	1	4		2	1	4		4	3	4	3	3		2	4	3		3	2		2		4			3						3			
MEADE	3	1	2	2	3	2				3	3	3	2	3	4	3	3	3					4	3			1	2				2			
MIAMI	2	4	4		2	3		2		3	2	3		2	3	3	3	2	1				2	2			3	2				2			
MITCHELL	2		2	2	1	3		4			2			3	3	2		2	3	1			2					2							
MONTGOMERY	1	2	2	2	2	3		3	4	4	2	3		2	2	3		3	2		1		1	3			3	1	1			1	1			
MORRIS		1		1	1	2		4		1	1	1		3		3		3														1			
MORTON	1		1	2	1	1							4		4	1		3					1	1			1					1			
NEMAHA	2		1		2	2		4	1		3		3	4	3	2	2	3	2		2	1						3	1						
NEOSHO	3	5	3	3	2	4		3	3	4	2	2		3	3		2	3	1			2	3					3	2			2			
NESS				2						2		2		3	4			3				1						2				3			
NORTON	1		2		2	3				3	1	2		2	2			4		3		2						2							
OSAGE	3	3	4		1	4		4		3	1	2		3	4	2	1	2	2	2		2	2					2				2			
OSBORNE	2		1	2		3		1			2	3		3	3			3	2		2		2	3			3	5	1			3			
OTTAWA				1	2			5				2		3	4	3		3	3				2	2								2			
PAWNEE		1	1	1	2	1	2			2	4			2	4			3	1		3		2					2				4			
PRATT		1	1	1	2	2			1	1	1	2	1	2	3	3		2	2					2				1	1			1			
PHILLIPS	3		3	2	2	3				3	2	4		2	3	1		2	2		5											2			
POTTAWOTOMIE	3			1	2	4		4		1	1	3		2	2	2	2	2	3		2		3	2											
RAWLINS	1		2	1	2	3				4	3	3		2	2			3	1		2		4	3			4					2			
RENO	3	1	2	3	2	3		3	3	3	3	3		3	3	3	4	3	3		3		1				1	1	1			2			
REPUBLIC	2	1	3		2	4		4		2	1	2		3	3	3		2	3		3		1	4			1	1	1			1	1		
RICE	2	1	2	2	1	3		3	2	2		2		3	3	3	1	2	3				1				2					2			
RILEY	1	3	1	3	2	4		4		3	2	1		3	4	3	2	2	3	3		3		3			1					2	2		
ROOKS	3			1	3	2				3	3	4		3	4	3	2	3	3	4		1	3				2					4			
RUSH	2		1		1	3				2	2			1	3	1	3	3				1	2									3			
RUSSELL	1		1	3		1			1	1		1		2	3	1		3	2	3		1										3			
SCOTT	4		2	4	2	4				1	4	3	3	1	4	4	1	4		3		4	4		1	1	4					3	2		
SEDGWICK	2		2	2	3		4		3	4				3	3	2	3	2	3			2	3									3			
SEWARD	3			1		2	2				1	1		3	2	2		3					4					2				1			
SHAWNEE	2	3	1	4	3	5		3	4	3	2	2		3	3	3	2	2	2				4	3				2				2			
SHERIDAN	3		2		2	3				1	3	2		3	3	2	1	3	1		3		1	3				2				3			
SMITH	2		2	1	2	4		4		2	3	3	1	3	4	1		2	1		4		3	2				2				3			
STAFFORD	2		2	3	2	3		1		2	2	3		3	4	1		3	4		4		1	2				2				3			
STANTON	3		3	1	3	1						3	1	3	3	1		3					3	1		1		1				4			
STEVENS	2		1		1	3				1	1	3	2	2	3	3		3														3			
SUMNER	2		2	1	3	4		3	3	2				3	3	3	3	3	3		3			3				1				2			
THOMAS	2		2	2	2	4				3	2	2		2	5	1	2	4			3		3					3				3			
TREGO			1		2	4				3	1	2			4	3	3				4		3					1				3			
WABAUNSEE	2		3		1	3		4	1	3	1	3		3	4	4	2	1	4		4		4	4				3	1						
WALLACE	2		3	2	2	3				2	3			2	4	1		4					3	2				3				2			
WASHINGTON			2		4	3	4	4		3	3	1		3	4		2	3	2		3		3	2								3			
WICHITA	2		3		4		4	3		3					4	2		5			3														
WILSON	3	5	2	2	2	3		4	2	3	4	4		3	4	2	3	3	1		2			5				2	2			1			
WOODSON	4	5	1	1	2	3		4	2	2	1	3		4	4	1	3	3					3												
WYANDOTT	4	4	3	3	4	5		2	3	4	3	2		3	4	4	3	3	2		3	3	4	1		4		3	4			4	2			

THE GENUS KELISIA IN AMERICA NORTH OF MEXICO
(Homoptera - Fulgoridae - Delphacinae)

R. H. BEAMER*

The genus **Kelisia** was described by Fieber in 1866 (Verh. Zool, Bot. Ges., Wein 16: 519) with the European species **Delphax guttula** Germar as haplotype. Z. P. Metcalf, in his **Catalogue of Fulgoroidea**, Fascicle IV, Part 3, Araeopidae, lists the following species as occurring in America north of Mexico: **axialis** Van Duzee, **crocea** Van Duzee, **parvula** Ball, and **salina** Ball. The types of all these species have been studied with the exception of **K. parvula** Ball, and drawings of this species and comments on it were made by Doctor J. S. Caldwell of the United States Bureau of Entomology and Plant Quarantine. **Kelisia axialis** Van Duzee is the only species of the four that belongs to this genus.

A cotype male of **Kelisia crocea** Van Duzee, collected at Ames, Iowa, by Professor Herbert Osborn, was studied. It belongs to that group of species placed in **Liburnia** by Metcalf in his recent catalogue not only by the characters of the internal male genitalia, but also by the external characters of both sexes. It is therefore placed in that genus and the specimen mentioned above designated lectotype.

An examination of four pairs of cotypes of **Kelisia salina** Ball revealed two species. Four specimens from Fort Collins, one from Wray, and one from Animas, Colorado, are **Megamelanus frontalis** Crawford. One female from Grand Junction and one male from Lamar, Colorado, are **Kelisia salina** Ball. The above two species are very closely related in external characteristics as well as in the internal male genitalia. **Kelisia salina** Ball is therefore placed in **Megamelanus**, and the female from Grand Junction, Colorado, is here designated lectotype.

Kelisia parvula Ball is a **Delphacodes**, near **Delphacodes wetmorei** Muir and Giffard. This leaves **Kelisia axialis** Van Duzee and seven new species to be considered in this paper.

I wish to thank Doctor L. D. Tuthill of the Department of Zoology and Entomology, Iowa State College, Ames, Iowa, and Doctors C. F. W. Muesebeck, and J. S. Caldwell of the United States Bureau of Entomology and Plant Quarantine for their very helpful cooperation in the study of type material. I am also indebted to Mrs. Alberta Mosier for help with the drawings.

Kelisia Fieber

Calcar foliaceous with coarse black teeth; front tibia normal; antennae terete, first segment about as wide as long; front much longer than wide, sides not parallel, narrowest at base, widest beyond middle, one median

* Contribution from the Department of Entomology, University of Kansas, Lawrence, Kansas.

carina forked at apex; vertex longer than width at base, slightly protruding beyond eyes; pronotum with lateral carina straight, not reaching hind margin.

KEY TO SPECIES OF KELISIA

1. Elytra with a brown or black, longitudinal stripe of regular width from base to tip 2
   Elytra usually without such a stripe 5
2. Dark mark of elytra continued across front ..... **flagellata n. sp.**
   Dark mark of elytra not continued across front 3
3. Black spot on front beneath each ocellus and one on lateral margin of pronotum above coxae ..... **pectinata n. sp.**
   Without black spot in either of these positions or only a very light one on margin of pronotum 4
4. Stripe on elytra very broad, occupying two thirds area **spinosa n. sp.**
   Stripe on elytra narrow, occupying about one third area **curvata n. sp.**
5. Black spot beneath each ocellus and on lateral margin of pronotum above front coxae ..... **bimaculata n. sp.**
   Without black spots 6
6. Black markings of elytra confined to a triangular shaped spot in elytra or none at all 7
   Black markings of elytra heavy at apex and base of elytra and usually narrowly following the second sector ..... **axialis Van D.**
7. Dark stripe on either side of abdomen continued over pronotum ..... **retrorsa n. sp.**
   Dark stripe of abdomen, when present, usually not continued over pronotum ..... **hyalina n. sp.**

1. Kelisia axialis Van Duzee

The original description of this species is a very good one. It is as follows: "Form of **K. guttula**; above piceous brown, beneath pale dull testaceous. A wide yellow vitta extends from near the apex of the vertex to the second dorsal segment of the abdomen. Elytra hyaline with anaxial brown vitta. Length 4 mm.

"Vertex tinged with testaceous on the anterior margin; entire face testaceous, obscurely marked with darker on the front next the lateral carinae; antennae yellow, paler toward their tips; eyes rufous; pronotum dark brown from the dorsal vitta to below the lateral margins; meta-, and mesonotum piceous brown with a broad median vitta extending onto the two basal segments of the tergum; lower surface and legs pale dull testaceous; mesonotum with a large brown spot; tarsal spines tipped with black; abdomen blackish brown, the sides of the venter varied with testaceous. Elytra hyaline, with a conspicuous brown vitta from the base to the extreme apex following the line of the second sector; first sector and the two first apical nervures white, the others brown or mostly so; apical nervures four, the interior forked.

"This species may be distinguished from its European congenors by its glassy elytra marked with a conspicuous longitudinal vitta, by the uniformly

testaceous inferior surface, and the absence of the black spots on the cheeks. Described from two examples representing both sexes, taken at Lancaster, New York, in August, 1886."

Male genitalia, lateral view: Styles widest at base, slightly S-curved, tapering gently to outer third, then rapidly to sharp apices. Aedeagus very long and slender with a slight flange before apex ventrally and a pair of short teeth dorsally almost at tip, tip bent ventrally and back basally in a slightly enlarged semihyaline apex. A pair of hairlike processes with enlarged apices arise laterally near base of anal ring and extend slightly beyond tip of aedeagus. Anal tube long and slender without hooks or spines.

The two cotype specimens have been studied. The male is here designated lectoholotype and the female the lectoallotype.

2. Kelisia flagellata n. sp.

Brachypterous Form

Resembling **K. axialis** but much smaller with black band of elytra continuous through eyes and across front to tip of elytra and processes on aedeagus without enlargements at tips. Lenth of male 2.25-2.5 mm.; female 3 mm.

Structure: Elytra widest near apex of scutellum, narrowing to slightly outcurved apices, extending beyond end of abdomen. Wings tiny oval pads.

Color: General color stramineous with a black stripe on elytra from apices to bases between first sector and first claval vein, crossing pronotum and connecting eyes over apex of front, curving slightly toward costal margin near apices of elytra. A dark spot on sclerite above coxae of middle leg. Styles and aedeagus brown, anal ring black. Female ovipositor brown.

Genitalia: Styles about as in **K. axialis,** somewhat wider at base, and sharply narrowed nearer apices. Aedeagus in lateral view long and slender but without the flange on venter and dorsal apical teeth. Processes coiled whiplike, thickest at bases, not enlarged at apices, as long or longer than the aedeagus.

Holotype male, allotype female, and four pairs of paratypes, Douglas Co., Kansas, October 24, 1944, R. H. Beamer; other paratypes, same place and collector; two males and eight females, October 18, 1944; one female, October 19, 1944; four pairs, October 24, 1944; five males and thirteen females, October 26, 1944; twelve males and thirty-five females, November 2, 1944.

Types in Snow Entomological Collections.

3. Kelisia spinosa n. sp.

Resembling **K. flagellata** but dark band of pronotum not connected through the eyes and across the front, and anal ring of male with a ventral spine near its base. Length 3.4 mm.

Macropterous Form

Structure: Elytra extending about one third their length beyond abdomen, widest just beyond apex of clavi, apices evenly rounded.

Color: General color buff to brownish, stripe on vertex, pronotum, mesal and costal margins of elytra, white. Elytra brown except very narrow mesal border and area outside of first sector semihyaline to white, brown band extending to eyes but not through them and across front as in **K. flagellata.** Black spot on lateral margin of pronotum just above base of front coxae. Front and clypeus evenly buff colored, remainder of venter mottled with darker. Ovipositor of female and genital segment of male evenly dark brown.

Genitalia in lateral view: Male style slightly S-curved, almost parallel margined on basal three fourths, suddenly contracted on outer fourth to sharp point. Aedeagus long and slender with a lateral notch just before tip, apex coiled backward and slightly enlarged; pair of lateral processes arise near base of anal ring, whiplike, as long as aedeagus, widest at base. Anal ring with a short sharp spine either side near base, at right angles to it.

Holotype male, allotype female, and three male paratypes, Brule, Wis., Aug. 16, 1937, R. H. Beamer; other paratypes: one male, same place and date, C. L. Johnston; one male and one female, New Haven, Conn., Aug. 20, 1934, R. H. Beamer; one male and one female, Rib Mountain State Park, Wis., Aug. 27, 1937, R. H. Beamer; one male, Cedar River, Mich., Aug. 26, 1937, R. H. Beamer; two males, Florence, Wis., Aug. 19, 1937, C. L. Johnston; five males, same place and date, R. H. Beamer; two pairs, Morris, Wis., Aug. 27, 1937, R. H. Beamer; one male, Thompson, Mich., Aug. 25, 1937, R. H. Beamer; one female, Gogebic, Mich., Aug. 18, 1937, R. H. Beamer.

Brachypterous Form

Like the former except the elytra are shorter, widest near base, gradually narrowed to almost pointed apices and the wings are reduced to tiny pads not one fifth as long as elytra. Length 2.5-3 mm.

Holomorphotype male, allomorphotype female and 6 male and 2 female paramorphotypes, Brule, Wis., Aug. 16, 1937, R. H. Beamer; other paramorphotypes: one male, same place and date, C. L. Johnston; one male, Keld, Manitoba, Canada, Aug. 8, 1937, R. H. Beamer; one male, Cowan, Manitoba, Canada, Aug. 7, 1937, R. H. Beamer; one male and two females, New Haven, Conn., Aug. 20, 1934, R. H. Beamer; six males and one female, Florence, Wis., Aug. 19, 1937, C. L. Johnston; three males and one female, same place and date, R. H. Beamer; one pair, Rib Mountain State Park, Wis., Aug. 27, 1937, R. H. Beamer; one pair, Morris, Wis., Aug. 27, 1937, R. H. Beamer; one female, Swan River, Manitoba, Canada, Aug. 2, 1937, R. H. Beamer.

Types in Snow Entomological Collections.

4. Kelisia retrorsa n. sp.

Brachypterous Form

Resembling **K. spinosa** but elytra not darkened except a wedge-shaped

mark at apex, anal segment of male without spines, and processes on aedeagus about half as long as shaft. Length of male 3.25 mm.; female 4.75 mm.

Structure: Elytra longer than body, broadest near tip of scutellum, narrowed at apex, almost sharp pointed, mesal margin rounded toward costal on outer third. Hind wings tiny pads, smaller than one eye.

Color: Stramineous, darker on the sides of the pro- and mesonotum, extended caudally on sides of abdomen as a dark stripe showing through hyaline elytra. Elytra hyaline except wedge-shaped dark spot between two branches of second sector at apex. Ovipositor, outer third of genital segment of male, ventral half of anal ring, dark, and more or less fumose marks on venter.

Genitalia in lateral view: Styles broadest at base, more or less S-shaped, narrowed and sharply bent caudad near outer third, ending in sharply pointed, dorsally curving apices. Aedeagus broadest on basal half, sharply narrowed just before a broad retrorse ventral tooth, beyond, less than half as wide as basal portion, apex turned ventrally and cephalad. A pair of processes arise laterally near base of anal ring, about half as long as aedeagus, whiplike, and widest on basal two thirds.

Holotype male, allotype female, and one pair of paratypes, Cedar River, Mich., Aug. 26, 1937, R. H. Beamer; other paratypes: one male, Itasca Park, Minn., Aug. 11, 1937, H. T. Peters; one male, same place and date, C. L. Johnston; one male, Brule, Wis., Aug. 17, 1937, R. H. Beamer; one male, Bath, N.H., Aug. 21, 1934, P. W. Oman.

Macropterous Form

Like the above but elytra with apices rounded, widest beyond tip of clavus. Hind wings longer than abdomen. Color of tip of elytra tending to extend up the second sector and on clavi from mesonotum.

Holomorphotype male, Eveleth, Minn., Aug. 13, 1937, H. T. Peters; paramorphotype male, Itasca Park, Minn., Aug. 11, 1937, H. T. Peters.

Types in Snow Entomological Collections; paratypes in United States National Museum.

5. Kelisia hyalina n. sp.

Brachypterous Form

Resempling **K. retrorsa** but aedeagus in lateral view much narrower, middle retrorse process with additional parts and lateral processes much thicker and heavier to their apices. Length 3.25-4.00 mm.

Structure: Elytra broadest near tip of scutellum, narrowing to rather sharp apices, extending about a fourth their length beyond abdomen. Wings reduced to tiny pads less than half as large as an eye.

Color: General color very light brown with a lighter stripe from tip of ver-

tex to apex of abdomen, on abdomen bordered by an irregular-sided fuscous area on either side. Elytra semihyaline, usually with a dark triangular spot occupying the area between the branches of the second sector, sometimes absent.

Genitalia in lateral view: Styles widest on basal third, slightly S-shaped, rapidly narrowing on outer third to dorsally curving apices. Aedeagus very long and narrow with a peculiar triangular process near middle ventrally, also a pair of lateral processes arising near base of anal ring, about as wide as shaft of aedeagus at middle and carrying this width well toward their apices.

Holotype male, allotype female, sixty-one males and thirty-five females, Douglas Co., Kansas, October 26, 1944, R. H. Beamer; other paratypes: ten males and seven females, Douglas Co., Kansas, October 18, 1944, R. H. Beamer; one pair, Douglas Co., Kansas, Nov. 2, 1944, R. H. Beamer; two females, Lawrence, Kansas, Aug. 23, 1944, R. H. Beamer; one male, Sumner Co., Kansas, Nov. 19, 1925, E. P. Breakey.

Macropterous Form

Like the brachypterous form except elytra longer, widest near apex of abdomen and wings fully developed. Length 4.25-5.25 mm.

Holomorphotype male, allomorphotype female, and one male paramorphotype, Douglas Co., Kansas, October 26, 1944, R. H. Beamer.

Types in Snow Entomological Collections.

6. Kelisia bimaculata n. sp.

Brachypterous Form

Resembling **K. hyalina** but with black spot of elytra faded to a smoky line and with two lateral black spots, one on face beneath ocellus and one on side of mesonotum above front coxa. Length 4-4.5 mm.

Structure: Elytra widest near tip of scutellum, tapering to sharp apices about one fourth their length beyond the abdomen. Hind wings tiny pads smaller than an eye.

Color: General color buff with median line from tip of vertex to apex of abdomen lighter. Elytra semihyaline with a semblance of a smoky line from bases to apices, slightly heavier at tips and extending across pronotum to eyes. Lateral margin of front with a sizable black spot beneath ocellus and a black dash on lateral margin of pronotum above base of front coxae.

Genitalia in lateral view: Styles widest at base, rapidly narrowing on outer third to sharp apices, slightly S-shaped. Aedeagus long and slender with a pair of very short lateral teeth about one fourth distance from tip, a three or more pronged process on ventral side near middle and a pair of processes arising near base of anal ring about as long as ring and rather thick throughout.

Holotype male, allotype female and one male paratype, Bath, N.H., Aug. 21, 1934, R. H. Beamer; one male and 2 female paratypes, same place and time, P. W. Oman; one male, Trout Lake, Wis., Aug. 13, 1936, D. M. DeLong.

Types in Snow Entomological Collections; paratypes in United States National Museum and Illinois State Natural History Survey.

7. Kelisia curvata n. sp.

Brachypterous Form

Resembling **K. bimaculata** but lacking the black mark beneath the ocellus and on the margin of the pronotum, and with a very distinct black curving band on elytra. Length 3.25-3.75 mm.

Structure: Elytra widest near apex of scutellum, slightly narrowing toward tip, but not nearly so sharp pointed as others in the genus, extending about one fourth their length beyond abdomen. Hind wings reduced to tiny pads about half the size of an eye.

Color: General color stramineous with a light stripe from apex of vertex to tip of abdomen. Dorsum with a black stripe from hind margin of eye and of the same width, to tip of elytra, curving slightly toward costal margin on outer portion to conform to margin of wing. More or less darkening of lateral sclerites above coxae, the larger and more definite one just above the hind coxae.

Genitalia in lateral view: Styles widest near base, slightly S-curved, rapidly narrowing on outer third to sharp apex. Aedeagus long and slender, widest at base, curved ventrally near middle with a peculiar process (see Fig. 7) located ventrally at about basal third, apex slightly swollen and twisted. Basal processes flat, bladelike, more than twice as broad at base as at middle, less than half as long as shaft of aedeagus, curved laterally and dorsally on apical third, with short, sharp process between them at their base.

Holotype male, allotype female, six male and seven female paratypes, Douglas Co., Kansas, October 26, 1944, R. H. Beamer; other paratypes: thirty-seven males and thirty-three females, same place and collector, October 24, 1944; twelve males and three females, Douglas Co., Kansas, Nov. 2, 1944, R. H. Beamer; one pair, Douglas Co., Kansas, July 13, 1944, R. H. Beamer; four males and one female, Okefenoke Swamp, Ga., Billy's Island, July 27, 1939, R. H. Beamer; one male, Columbus, Ohio, Oct. 4, 1940, Parker; one male, Bowie, Md., Oct. 31, 1941, P. W. Oman; one male, Dorchester Co., near Lloyds, Md., July 10, 1907, H. S. Barber.

Macropterous Form

Like the above but with flight wings. Elytra almost parallel-sided to apex of clavi, apices rounded; hind wings longer than abdomen. Length 4-5 mm.

Holomorphotype male, allomorphotype female and one male and four female paramorphotypes, Douglas Co., Kansas, Oct. 24, 1944, R. H. Beamer;

two pairs, same place and collector, Nov. 2, 1944; three males, Washington, D.C., Oct. 5, 1941, P. W. Oman; one male, Dorchester Co., near Lloyds, Md., July 10, 1907, H. S. Barber.

Types in Snow Entomological Collections; paratypes in United States National Museum.

8. Kelisia pectinata n. sp.

Brachypterous Form

Resembling **K. curvata** but with a fairly large dark spot on face below each ocellus and another rectangular spot on lateral margin of pronotum just above front coxae. Length 4-4.5 mm.

Structure: Elytra widest near apex of scutellum, tapering to long, almost sharp apices. Hind wings tiny pads, smaller than an eye.

Color: General color stramineous with a light stripe from apex of vertex to tip of abdomen. Elytra hyaline with a median longitudinal brown stripe about as wide as eye running from tip to base and crossing pronotum to eye. Front with an angular black spot below each ocellus. Rectangular black spot on lateral margin of pronotum above front coxae, and two more lighter brown spots in a line caudad of this. Margin of abdomen with a row of more or less definite light brown spots on either side.

Genitalia in lateral view: Styles widest at base, slightly S-shaped, rapidly narrowed on a little more than outer third to sharp apices. Aedeagus very long and narrow, widest at base, narrowed near middle, usually with a pectinate ventral process with five teeth just before this contraction, shaft widened on outer third, in dorso-ventral view apex broadened with a short sharp diverging process on either side of a swollen middle portion from which the ejaculatory duct protrudes; pair of processes at base of anal ring widest near their middle, wider than aedeagus, narrowed and curved ventrally on outer third, set with short sharp teeth in this region.

Holotype male, allotype female and one male and three female paratypes, Douglas Co., Kansas, Oct. 26, 1944, R. H. Beamer; other paratypes: two males and four females, Douglas Co., Kansas, Oct. 19, 1944; five males and one female, Douglas Co., Kansas, Nov. 2, 1944; one male, Douglas Co., Kansas, Oct. 18, 1944; one pair, Lawrence, Kansas, Aug. 23, 1944; two females, Lawrence, Kansas, Sept. 1, 1944, all collected by R. H. Beamer; five males and five females, Meade Co., Kansas, Sept. 13, 1944, R. H. Beamer; one female, Sand Dunes, Medora, Kansas, June 21, Don Wilbur.

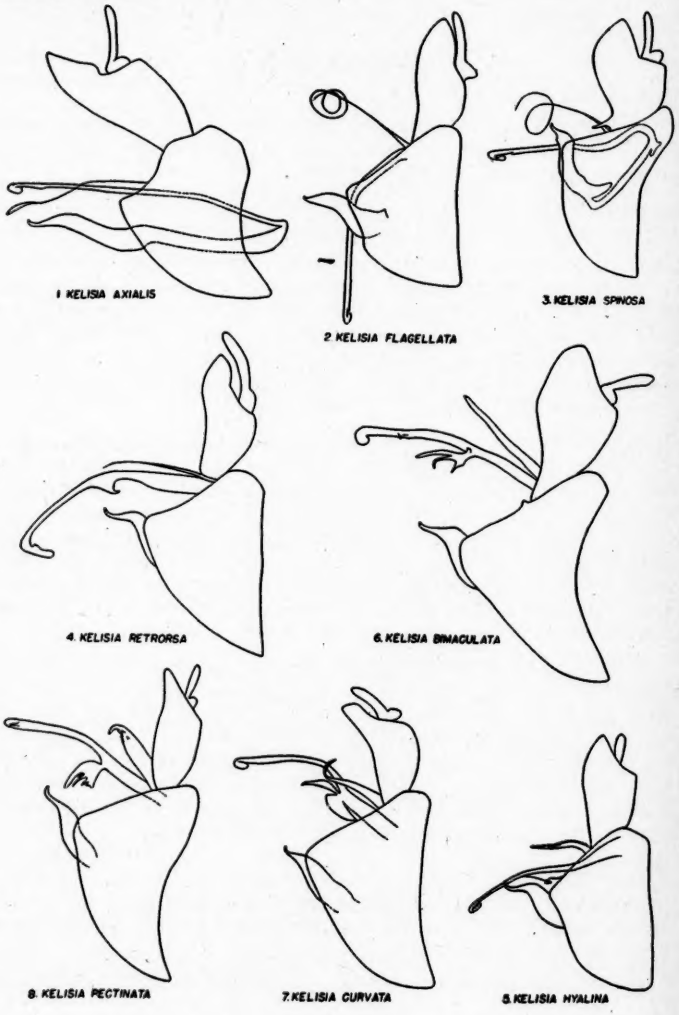
Macropterous Form

Just like the above except elytra widest near apices of clavi, tips more broadly rounded, extending one third their length beyond abdomen and the hind wings fully developed. Length 4.5-4.75 mm.

Holomorphotype male and three paramorphotype males, Douglas Co.,

Kansas, Oct. 19, 1944, R. H. Beamer; allomorphotype female, same place and collector, Oct. 18, 1944.

Types in Snow Entomological Collections; paratypes in United States National Museum.



SIPHONAPTERA: A NEW SPECIES OF CONORHINOPSYLLA FROM KANSAS[1]

WILLIAM L. JELLISON, *Sanitarian* (R)
United States Public Health Service

Several collections of fleas from the nests of wood rats, **Neotoma floridana**, taken near Lawrence, Kansas, by R. H. Beamer and his associates in biology at the University of Kansas, represent an undescribed species of **Conorhinopsylla.**

Conorhinopsylla is a very distinct genus of fleas and so far is known only from North America. It is known only by the genotype **C. stanfordi** Stewart, of which both sexes have been described and figured by Stewart (1), Jordan (2), and Ewing and Fox (3).

Conorhinopsylla nidicola, n. sp.

This species is closely related to **C. stanfordi** but is readily distinguished by the modified abdominal segments of the male which are figured. In **C. stanfordi** the finger (F) and process (P) of the claspers are projected posteriorly on a much elongated lobe. This is not prominent in **C. nidicola.** In **C. stanfordi** the finger of the clasper is almost covered by the broad oval process as figured by Jordan (1937). In **C. nidicola** the process covers only a small basal portion of the finger. In **C. stanfordi** the posterior arm of sternite IX is long and tapering and exceeds sternite VIII. It ends in a posteriorly directed point. In **C. nidicola** the posterior arm of sternite IX is short and broad and does not equal sternite VIII. It terminates with the apex turned dorsally in a short hook. The posterior arms of sternite VIII are shorter in **C. nidicola** than in **C. stanfordi** but, like **C. stanfordi,** are ornamented with two rows of pale spinelets and a row of fine setae.

There are no conspicuous differences in the modified segments or receptaculi of the females of the two species.

The general characters as the shape of the head, number of pronotal spines, number and arrangement of apical spinelets on abdominal tergites, and the conspicuous long bristles on segments I and II of the hind tarsus appear much the same in both species. The eye is distinctly less pigmented in **C. nidicola** and the labial palpi have 8 or more segments in contrast to 5 or 6 in **C. stanfordi.**

The following specimens collected about 6 miles north of Lawrence, Kansas, from the nests of wood rats, **Neotoma floridana,** constitute the type series. Holotype male and allotype female, 64 paratype males and 92 paratype females collected November 11, 1944. Thirty-five paratype males and 41 paratype females collected March 1945. Types are deposited in the collection of the Rocky Mountain Laboratory. Paratypes are deposited in the

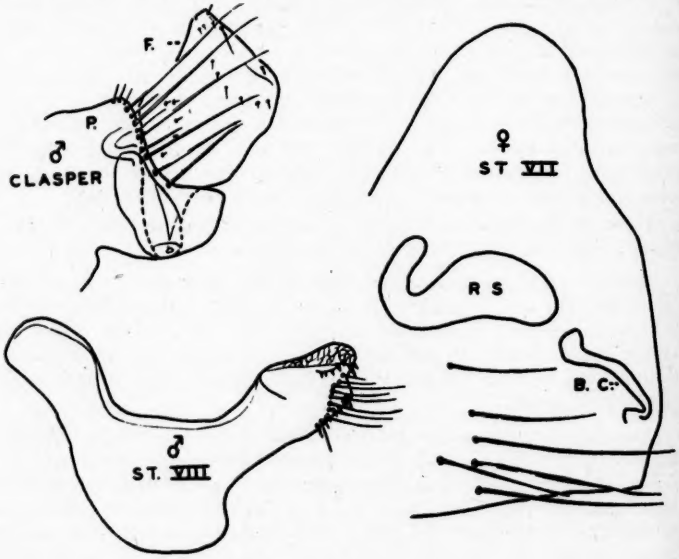
[1] From the Rocky Mountain Laboratory (Hamilton, Mont.), National Institute of Health.

Snow Collections, University of Kansas, and in the United States National Museum.

A male and a female collected from **Peromyscus** sp. at Cache Co., Oklahoma, February 5, 1941, by Fred McMurray are also of this species.

The writer has specimens of **C. stanfordi** from **Glaucomys volans,** Ithaca, New York, one male, collected by Robert Traub, and from **Glaucomys volans,** Ingham County, Michigan, December 1940, 4 males and 3 females, collected by Miss Lauzun.

The few collection records that have been published indicate that **C. stanfordi** is a parasite of various arboreal squirrels in the genera **Glaucomys, Sciurus,** and **Tamiasciurus** all of the family Sciuridae, while the species here described seems to be a parasite of **Neotoma** and **Peromyscus** of the family Cricetidae. There are several other genera of fleas in North America of which one or more species are characteristic of tree squirrels and one or more species are characteristic of deer mice, **Peromyscus,** or wood rats, **Neotoma,** both of which are in the family Cricetidae. These genera are **Monopsyllus, Opisodasys,** and **Orchopeas.** Discovery of **C. nidicola** in the nests of **Neotoma** and on **Peromyscus** adds another genus of fleas to those known to be shared by tree squirrels and Cricetidae in North America.



C NIDICOLA

References

(1) Stewart, M. A.: New Nearctic Siphonaptera. Canadian Entomologist 62: 175-180 (1930).

(2) Jordan, K.: On some North American Siphonaptera. Novitates Zoologicae 40: 262-271 (1937).

(3) Ewing, H. E. and Fox, I.: The fleas of North America. U.S. Dept. Agric., Misc. Pub. No. 500: 1-142 (1943).

NOTES ON KANSAS BUTTERFLIES

DON B. STALLINGS and J. R. TURNER
Caldwell, Kansas

Hesperia attalus (Edwards). Previously this species has been represented in Kansas check-lists by a single specimen caught in Montgomery County, Kansas. During the season of 1944 we took a small series of this species (which appear to be typical) in Sumner County, Kansas. The first brood appeared June 4 and was in flight till June 18. The second brood was in flight from August 31 till Sept. 10. This species would appear to be native in Kansas, although rare.

Atlides halesus estesi (Clench). A single specimen of this race was taken in Sumner County on June 15, 1944. It was caught in association with **Strymon alcestis.** This has not been recorded from Kansas previously and, for the time, must be considered a stray.

Strymon azia (Hew.). In a previous issue (Vol. XVII, p. 79, 1944) we reported the taking of a single specimen of **Strymon leda** (Edw.) captured in Sumner County, Kansas, June 3, 1943. A more careful study of this ragged specimen shows that it is **Strymon azia** rather than **leda.** Check lists should be corrected accordingly.

Hemiargus isola (Reak.). Reakirt described **isola** from specimens taken near Vera Cruz, Mexico. Later Edwards described **alce** from specimens taken in Colorado. Until recently **alce** has been treated as a synonym of **isola.** Field suggested that **alce** had racial value and used the name **alce** for the **isola** specimens occurring in the United States and northern Mexico. He distinguished the two as follows: "In typical **isola** the ground color of the under-surfaces is a dark grey while in **alce** this color is brownish grey, sometimes almost white. The palpi, underside of thorax and abdomen in **alce** are white, in **isola** grey." We consider this a good basis of separating **isola** from **alce** but we are unable to find any racial value in these differences, rather only a seasonal difference. We consider **alce** to be the summer form of **isola.** We have specimens of **alce** from, Kansas, Colorado, and through the Southwest into Mexico as far south as Vera Cruz. On the other hand we have good specimens of **isola** from Kansas (Oct. 29, 1944) and Colorado (Aug. 16, 1942, Beulah, Colo., Elevation 7500'). In extreme specimens of **isola** the under-surfaces are very dark and almost immaculate. The upper-surfaces of the females show more bluish and the males have a much darker bluish color on the upper-surfaces.

A LIST OF BUTTERFLIES (RHOPALOCERA) COLLECTED IN COWLEY COUNTY IN 1944

DELBERT WENIGER
Winfield, Kansas*

Upon investigation of the records of butterflies and their distribution in Kansas, it was found that only two species have been reported as occurring in Cowley County. These, as cited by Field (1938), are **Vanessa atalanta** and **Colias philodice.** Extensive studies have been made in other counties of Kansas. Field[1] (1938) says that "almost complete records are available on species occurring in . . . Scott, Harper, Sedgwick, Crawford, Douglas, Sumner, Greenwood and Riley counties." A majority of the other counties of the state have more or less complete records. He makes a plea for "local lists of butterflies taken anywhere in Kansas."

At the beginning of the 1944 season, therefore, the writer entered upon the project of preparing a list of the Rhopalocera found to be flying in Cowley County during that season. Of necessity the study had to be limited to a single season.

In order to gain as great completeness as possible almost daily trips were made to likely spots for flying butterflies. Alfalfa fields were the chief collecting places. More particular search had to be made for some species, however. Several, including some skippers, were found only where a hedge ran along the edge of an alfalfa patch. An alfalfa field within a few hundred feet of the Walnut River and bordered by dense thickets always yielded several species not seen elsewhere. One species was observed only in the back-yards of Winfield; another only in the heavy timber along the Walnut River.

At least one specimen of each species reported here was taken and the identification was made from the mounted specimen. At least one representative of each species has been placed in the permanent collection of the author.

An attempt has been made to keep records of the dates upon which particular species have been seen throughout the season in order to record something of the adult butterfly activity in the county. It seems that the only efforts made to record such dates in Kansas have been those of Randolph[2] (1929), Field (1938), and occasional notes on individual species since then. When enough of these are available it will be possible to make seasonal schedules for their activity. In the present paper, each species was taken and reported on the first day seen. It is regretted that this project was not started until the first of June; therefore species taken near the first of June might have been flying earlier. There is also a probability that some

* Contribution from the Department of Biology, Southwestern College, Winfield, Kansas.

[1] A Manual of the Butterflies and Skippers of Kansas. Bul. 12, Dept. of Entomology, University of Kansas, May 15, 1928.

[2] A Calendar of Kansas Butterflies, Entomological News, Vol. 40, pp. 88-92, 1929.

very early-flying species were missed altogether. For any species that was seen more than once, the date of its last appearance is given.

Except for commonly distributed forms, an effort has been made to correlate the finding of each species in Cowley County with the previously known occurrences of that species. In some cases, this record means an extension of the range. Records cited are those accepted by Field (1938) unless stated otherwise.

The classification and nomenclature of Field (1938) is followed in the listing of the species in this paper.

I wish to thank Dr. Charles E. Burt, of the Biology Department, Southwestern College, for his encouraging help and suggestions. I also wish to thank Mr. Don B. Stallings, of Caldwell, for checking the determinations of certain species.

1. **Minois alope olympus** (Edwards).

The dark form of this butterfly was secured on July 7. Another was seen and taken on July 11.

The light phase with the light ochrous area around the ocelli of the forewing was taken on July 6. This form was very common throughout the summer until the end of August and was seen occasionally as late as Oct. 5.

2. **Polygonia interrogationis** (Fabricius).

Two specimens of the typical **interrogationis** were taken on June 6. It was abundant until the third week of August when it disappeared for the season.

The form **fabricii** was taken on September 15, and was seen occasionally until October 22.

3. **Nymphalis antiopa creta** Verity.

A single specimen of this subspecies was taken on September 15. Another was seen on October 22.

4. **Vanessa atalanta italica** Stichel.

This butterfly was taken on June 14 and was observed from then until the middle of August rather commonly. After that only two were seen, one on September 20 and the other on October 24.

This is one of the two species previously reported from Cowley County.

5. **Vanessa virginiensis** (Drury).

Both a male and a female of this butterfly were taken on June 15. The species was commonly found until the first of September.

6. **Vanessa cardui carduelis** Cramer.

This butterfly was taken on June 14. It was common until November 20.

7. **Precis coenia** (Hubner).

Two specimens were netted on June 6 and the butterfly was seen until November 10. On Nov. 10, the form **rosa** was taken.

8. **Basilarchia archippus** (Cramer).

A specimen was taken on July 11. The butterfly was seen occasionally on the wing until September 26.

9. **Asterocampa celtis** (Boisduval & LeConte).

Both a male and a female were taken in Cowley County on June 6. The species was common until October 5.

Asterocampa celtis montis (Edwards).

A male specimen of this subspecies was captured on July 7. It was the only one seen during the season, but it was a perfect specimen, plainly **montis.** The identification was kindly checked by Don B. Stallings.

This subspecies is listed by Field (1938) as "Having been recorded in Kansas from wind-blown specimens or strays that are far out of their normal range." He gives its range as "inhabiting the Rocky Mountains." The only previous Kansas record of the subspecies is from Scott County in the western part of the State. Its occurrence in Cowley County thus extends the range about 200 miles to the east. It is my opinion that while rare in Central and Eastern Kansas it is a resident in these localities. This specimen was no wind-blown individual, but was fresh and perfect. Furthermore, in 1942, while I was collecting in Kingman County, I took three perfect specimens of **montis,** including both male and female, which I still have in my collection. I believe that through close observation **montis** will be found over much of the State. It is perhaps often overlooked because it cannot be distinguished from typical **celtis** unless caught and examined.

10. **Anaea andria** Scudder.

A male specimen of typical **andria** was taken on July 7. The butterfly was not seen again until the last of July, when it became quite common until November 9, its last occurrence. During August those taken were form **andriaesta.**

11. **Anthanassa texana** Edwards.

This butterfly was taken on June 20. It was once again seen on July 10. After that it was rarely seen until the last of July when it became quite common. The last listing is November 9.

The species seems not to be common anywhere in Kansas except in the area of Harper, Sumner and Cowley Counties. While it also is recorded in Douglas County it was only from two specimens taken in 1929. Far to the west and north in Scott County it is reported to occur late in the fall. None of the counties in the southeast report it except Greenwood. It is ,however, one of the commonest butterflies in the back-yards of Winfield in August and September, but, strange to say, it is not found outside the city.

12. **Phyciodes gorgone** (Hubner).

This butterfly was taken on June 14. While Field (1938) says that it is very common in Eastern Kansas, this was the only specimen located in Cowley County all season.

13. **Physiodes nycteis** (Doubleday & Hewitson).

This butterfly was taken only on July 21.

The species is not common in Kansas, being recorded from only 9 counties. Of these 9 counties, 7 are in the very eastern section of the State, from Leavenworth and Riley in the North to Crawford, Labette and Greenwood in the Southeast. West of this area it has not been recorded previously at all in the south part of Kansas and in the north only in Wallace and Scott Counties. There is thus a wide area through central and southwest Kansas where it has not been taken. This Cowley County report extends its range west and south into this area.

14. **Phyciodes phaon** (Edwards).

A single specimen of the typical **phaon** was taken on July 1. The identification of this butterfly as **phaon** was checked by Don B. Stallings. It was the only specimen of this species taken during the year.

The species has been taken before in Douglas, Greenwood and Sumner Counties. It seems to be far from common in Kansas.

15. **Phyciodes tharos** (Drury).

This butterfly was taken on June 8. The species became rather common during the latter part of June and remained so until November 6 when it was last seen.

16. **Phyciodes vesta** Edwards.

A single perfect specimen was taken on June 16. Its identification was checked by Don B. Stallings.

It is evidently a very rare species here and in all of Kansas. It has been reported from only Harper, Scott and Riley Counties previously.

17. **Euptoieta claudia** (Cramer).

This species was taken on June 6. Thereafter it was extremely abundant all through the season until it disappeared on October 31. It is a close contender for the place as Cowley County's most common butterfly.

Dr. Field (1938) describes an aberration of this species called **albaclaudia** as having a whitish-brown ground color in place of the usual orange-brown. The only record of the aberration in Kansas is that of Don B. Stallings (1941) who reported the taking of eight specimens in Sumner County in 1940.

On June 16, 1944, a butterfly of the species was taken in Cowley County which appeared at first sight to be a badly wind-blown and faded specimen. However it was noticed that the wings were perfect and lacked the frayed edges usually found on a specimen which has encountered such hardships

as to fade it so appreciably. I could not detect damage or find any peculiarity other than color. Yet its ground color was almost white, shading into buff in the darker regions. A microscopic examination was made to see whether there had been such a great loss of scales as to result in the light color. The wings showed no more effect of brushing and damage than the wings of a typically colored specimen. The series of this aberration taken by Don B. Stallings has been studied and in comparison it was found that this specimen is decidedly lighter than any of those. It is the writer's opinion that this is really a specimen of the color variety, **albaclaudia.**

18. **Dione vanillae incarnata** Riley.

This rare Kansas butterfly was taken on June 14 and again on June 21. It was not seen again.

It is reported from nine counties, all except Scott County being in the Eastern half of the State. It has been taken in the area around Cowley County and so was expected here. The surprising thing was the date of its appearance. It is on the wing in Crawford County from the first of August until the 15th of September. Here it occurred only in June.

19. **Danaus plexippus** (Linnaeus).

This common butterfly was taken on June 7 and was seen until November 5.

20. **Libythea bachmanii** Kirtland.

This butterfly was taken on July 7 and was seen until about the third week in July. After that only two specimens were observed and the date was September 12. It was never common.

21. **Strymon melinus** (Hubner).

This butterfly was taken on June 6. It was common through all the season as late as October 22.

22. **Lycaena (Tharsalea) thoe** (Guerin).

A single specimen of this butterfly was seen and taken on July 18.

It is a rare butterfly in Kansas. It has been reported from 5 counties previously, but not before from this part of the State. Field's (1938) listing from Sumner is an error.

23. **Leptotes marina** (Reakirt).

A single specimen of this butterfly was taken on August 14. Another was secured on September 16 and a third on September 21. They were all **reakirte** Field, the female form.

The species has been taken before in 6 Kansas counties. It has been found in Harper, Sumner and Greenwood Counties in this area.

24. **Hemiargus isola alce** Edwards.

A specimen was taken on June 6 and another on July 12. After that date it became rather common until about October 11.

It has not been reported from the counties directly east of Cowley.

25. **Everes comyntas** (Godart).

A specimen of the spring form of this butterfly which is called **meinersi** Field, was taken on June 6.

On July 10 the typical **comyntas** was taken. This form was common until September 26.

26. **Colias philodice** Godart.

On June 14 a specimen of the typical **eurytheme** Boisduval was taken.

On August 17 the form **philodice** was netted.

On June 14 the white female form **alba** Strecker was obtained.

The species was seen until November 14 of that season. This is the second species formerly reported from Cowley County.

27. **Colias (Zerene) caesonia Stoll.**

The typical summer form **caesonia** was taken on June 21. During that week at least four were seen on the wing and then no more were observed.

28. **Phoebis sennae eubule** (Linnaeus).

Both a male and a female were taken on September 18. This was the earliest date on which it was seen here. Several more were seen during that week and the last for the year was observed on October 31.

29. **Eurema mexicana** (Boisduval).

A single perfect specimen of this butterfly was taken on July 11. The species was not seen again until October 17, when another was taken. From that time until November 10 it was occasionally seen.

The species has been reported from only 8 counties of Kansas previously. Only Sumner and Harper have before reported it in the south-central area.

30. **Eurema nicippe** (Cramer).

Two specimens were taken on June 14. The species was seen occasionally until the second week of July when it disappeared for the year.

31. **Eurema lisa** (Boisduval & LeConte).

Two specimens were taken on June 11. It was seen until October 31. On June 11 a specimen of the white female form **alba** was taken.

32. **Nathalis iole** Boisduval.

This butterfly was first taken on June 16. It was seen occasionally after that until the middle of July. Then it became very common. It was last seen on November 10.

33. **Pieris protodice** Boisduval & LeConte.

A specimen of the spring form of this species, **vernalis** Edwards was taken in Cowley County on June 14.

The common typical **protodice** was taken on July 11 and was last seen on October 24.

34. **Pieris rapae** (Linnaeus).

This butterfly was taken on June 14. It became rather common and remained so until its last appearance on October 25.

35. **Papilio ajax** Linnaeus.

A specimen of the typical form was taken on July 10. The species was fairly common through July and until last seen on November 14.

36. **Papilio glaucus** Linnaeus.

Two specimens of the dark female form were taken on July 18, a male specimen on July 24. The species was seen as late as September 12.

37. **Epargyreus clarus** (Cramer).

This butterfly was taken on June 5. It was rather common until the middle of July, after which it was seen no more until the first of September. By September 7 it was more common than it had been earlier. It was last seen on September 16. It is suggested that two broods must have been produced during the season.

38. **Pyrgus communis** (Grote).

This butterfly was taken on June 6 and was common until November 10.

39. **Pholisora catullus** (Fabricius).

This small black skipper was first taken on July 21 and from that date on it was one of the most common skippers until September 16.

This appears to be a very common species in western Kansas, but it has not been reported from any of the counties directly east of Cowley. This record from Cowley County is therefore an advance of the range toward the southeast.

40. **Pholisora hayhurstii** (Edwards).

This butterfly was taken on July 24. For about four weeks thereafter the species was occasionally seen in flight. It was not observed later except for a single specimen taken on September 16.

The species is far from common in Kansas, being previously reported from only 6 counties. These are Rooks, Osborne, Riley and Douglas Counties across the Northern part of Kansas; Sumner County just west of Cowley and Greenwood County northeast of Cowley. Like the preceding species, this one has not been taken in the southeastern corner of the state. Here again the record is a new advance of the range toward the southeast.

41. **Erynnis horatius** (Scudder & Burgess).

This butterfly was taken in Cowley county on August 14 and it was occasionally seen on the wing until Septeber 18. The identification of the species was checked by Don B. Stallings. It is rather rare in Kansas. It has been recorded from Scott, Riley, Sumner, Greenwood and Douglas Counties previously. Thus, again, Cowley County is a new record for southeastern Kansas.

42. **Hylephila phylaeus** (Drury).

Two specimens were taken on August 14; another on September 18.

The butterfly is rather rare in Kansas, having been reported from Scott, Sumner, Greenwood, Riley and Douglas Counties only. Once again the same extension into the southeastern area is made by this record.

43. **Atalopedes campestris** (Boisduval).

This butterfly was first taken on June 6. It was seen until November 10, being perhaps the most common skipper here this season.

44. **Polites themistocles** (Latreille).

A single specimen was taken on June 6. It was not seen again until August 29, when two perfect specimens were netted. From then on until September 26 it was rather common.

45. **Atrytone logan** (Edwards).

This butterfly was taken first on August 9; again on August 29; and finally on September 16. It was rare. The identification was checked by Don B. Stallings.

The species is apparently rare in Kansas. It has been reported only from Clark, Pratt, and Reno Counties in the south-central area and from Greenwood and Douglas in the east. It has not been reported from any of the counties about Cowley County or in the southeastern corner of the State.

46. **Atrytone ruricola** (Boisduval).

A single specimen of this butterfly was taken on June 5. It was not seen again.

It has been reported previously only from Pottawatomie, Sumner, Greenwood and Douglas Counties.

47. **Ambyscirtes nysa** Edwards.

Two specimens were taken on August 10. This identification was checked by Don B. Stallings.

48. **Lerodea eufala** (Edwards).

A single specimen of this butterfly was taken on September 12. Its identification was checked by Don B. Stallings.

The species has been reported previously from Scott, Sumner, Greenwood, Harper, and Douglas Counties. This Cowley County record is therefore a southeastern advance of the range.

1945 Additions

The foregoing records of the 1944 season are incomplete because of the fact that observations were not begun until June 1. In 1945, catching and recording was begun with the first butterfly seen. The following list, therefore, supplements the preceding list and gives the dates of the first appearance of the species flying earlier than June 1.

1. **Polygonia interrogationis fabricii** Edwards, March 20.
2. **Nymphalis antiopa creta** Verity, March 15.
3. **Vanessa atalanta italica** Stichel, March 16.
4. **Vanessa cardui** (Linnaeus), March 20.
5. **Anaea andria** Scudder, March 17.
6. **Phyciodes tharos marcia** Edwards, April 20.
7. **Euptoieta claudia** (Cramer), March 26.
8. **Danaus plexippus** (Linnaeus), April 11.
9. **Everes comyntas meinersi** Field, May 7.
10. **Colias philodice ariadne** Edwards, March 31.
11. **Pieris rapae** (Linnaeus), March 20.
    form **immaculata**, April 2.
12. **Papilio glaucus** Linnaeus, April 9.
13. **Epargyreus clarus** (Cramer), April 11.
14. **Pyrgus communis** (Grote), May 4.
15. **Pholisora catullus** (Fabricius), May 6.

In addition, two species which have not before been reported from Cowley County were taken in 1945.

1. **Lycaenopsis argiolus** (Linnaeus).

   Form **neglecta** of this species was taken in Cowley County on March 28. It was not seen again.

2. **Euchloe olympia rosa** Edwards.

   Two specimens of this species were netted in Cowley County on March 31. It was not observed again.

PRICE OF BACK VOLUMES

Back Volumes $2.00 per volume

Subscriptions for back volumes or numbers should be sent to Donald A. Wilbur, Department of Entomology, Kansas State College, Manhattan, Kansas.

CONTENTS OF THIS NUMBER

The Fourteenth or 1944 Annual Insect Population Summary of Kansas.

GEO. A. DEAN, ROGER C. SMITH and E. G. KELLY 85

The Genus Kelisia in America North of Mexico (Homoptera - Fulgoridae - Delphacinae).

R. H. BEAMER 100

Siphonaptera: A New Species of Conorhinopsylla from Kansas.

WILLIAM L. JELLISON 109

Notes on Kansas Butterflies.

DON B. STALLINGS and J. R. TURNER 111

A List of Butterflies (Rhopalocera) Collected in Cowley County in 1944.

DELBERT WENIGER 112